

**Taxonomic studies of the Rotifera (Phylum Aschelminthes)
from a Central Amazonian varzea lake, Lago Camaleão
(Ilha de Marchantaria, Rio Solimões, Amazonas, Brazil)**

by

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Abstract

Four series of plankton samples collected 1981 in Lago Camaleão, Central Amazonia, a lake with fluctuating water levels, were investigated for rotifers. 148 species were identified. The number of rotifers increases with the rising water. In February 33 and in July 138 taxa were found. Several identifications by former authors were revised (*Brachionus urceolaris amazonica* n. ssp., *Keratella nhamunda* nov. nom., *Lecane aspasia amazonica* n. ssp.). New records for the Amazon region include *Lecane stichaeoides*, *Mytilina unguipes*, *Testudinella greeni*, *Testudinella patina dendradena*. Three new rotifers are described: *Cephalodella paggia* n. sp., *Lecane (Monostyla) marchantaria* and *Lepadella minooides* n. sp.

Keywords: Rotifers, Amazonian Region, taxonomical studies, new records.

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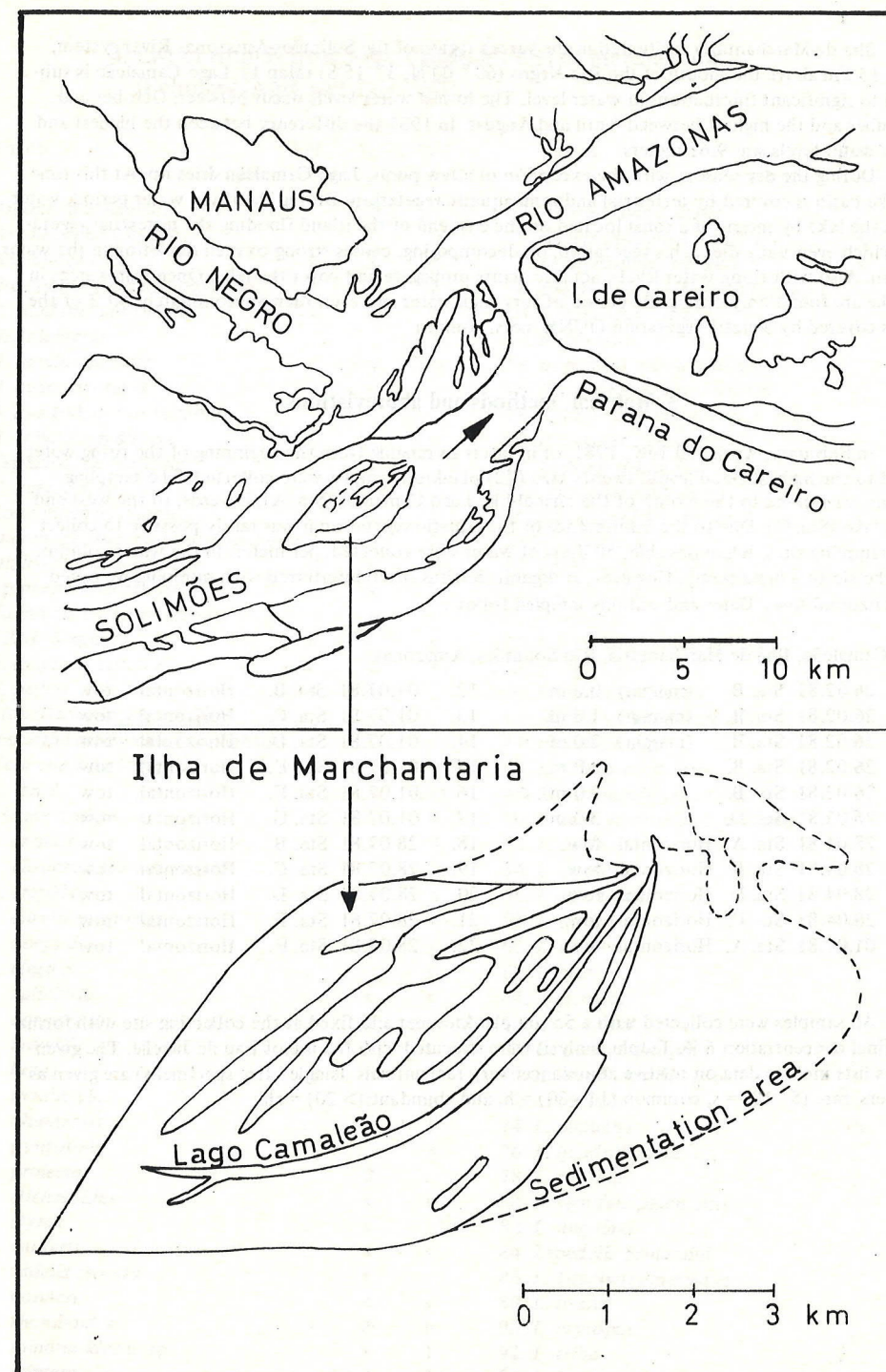
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1. Introduction

Four series of plankton samples were collected in Lago Camaleão, an Amazonian varzea lake, in 1981. The rich rotifer fauna found in these samples provided an opportunity to complete the observations of other authors and revise some current taxonomical problems. 148 species of rotifers were identified and among these are new records for the Neotropics, new subspecies and new species. Unfortunately, due to the artefacts of fixation, it was impossible to identify the Bdelloidea and soft-skinned Monogononta. Further studies of the living rotifers will not only rectify this problem, but also contribute to our knowledge of the Amazonian rotifer fauna.

2. Description of study area

Lago Camaleão, an elongated, narrow lake (6.5 km long, 300 - 500 m wide) is located on the Marchantaria Island (Ilha de Marchantaria, or Ilha dos Mouras). (Lago Camaleão is sometimes referred to as Lago de Marchantaria although there are other lakes on the island).



Map 1:
Lago Camaleão on the Ilha de Marchantaria (Ilha dos Mouras)

Ilha de Marchantaria is situated in the varzea region of the Solimões-Amazonas River system, about 15 km above the mouth of the Rio Negro (60° 00'N, 3° 15'S) (Map 1). Lago Camaleão is subjected to significant fluctuations in water level. The lowest water levels occur between October and December and the highest between April and August. In 1981 the difference between the highest and lowest water levels was 9.61 meters.

During the dry season, with the exception of a few pools, Lago Camaleão dries up. At this time the lake basin is covered by terrestrial and semi-aquatic vegetation. During the rising water period, water enters the lake by means of a canal located on the east end of the island flooding the terrestrial vegetation which eventually dies. This vegetation, on decomposing, causes strong oxygen depletion in the water column. Also with rising water levels, aquatic plants propagate and cover the lake. Open water areas in the lake are found only during the period of very high water and even then approximately 50 % of the area is covered by aquatic vegetation (JUNK, pers. comm.).

3. Material, methods and abbreviations

In February, April and July, 1981, or in intervals ranging from the beginning of the rising water period to the highest flood levels, twenty two (22) plankton samples were collected. The sampling stations correspond to the mouth of the chanel-like Lago Camaleão (Sta. A), inwards, to the west end of the lake (Sta. G). Due to the interference of the aquatic vegetation it was rarely possible to collect at all sampling sites. When possible, 50 liters of water were collected, per meter, in the water column, with the aid of a hand pump. However, as organic detritus often interfered with pumping we opted for horizontal tows. Dates and stations sampled follow:

Lago Camaleão, Ilha de Marchantaria, Rio Solimões, Amazonas

1.	26.02.81	Sta. B.	(margin)	0.0 m	12.	01.07.81	Sta. B.	Horizontal	tow
2.	26.02.81	Sta. B.	(margin)	1.0 m	13.	01.07.81	Sta. C.	Horizontal	tow
3.	26.02.81	Sta. B.	(margin)	2.0 m	14.	01.07.81	Sta. D.	Horizontal	tow
4.	26.02.81	Sta. B.		2.0 m	15.	01.07.81	Sta. E.	Horizontal	tow
5.	26.02.81	Sta. B.		3.0 m	16.	01.07.81	Sta. F.	Horizontal	tow
6.	26.02.81	Sta. D.		2.0 m	17.	01.07.81	Sta. G.	Horizontal	tow
7.	28.04.81	Sta. A.	Horizontal	tow	18.	28.07.81	Sta. B.	Horizontal	tow
8.	28.04.81	Sta. B.	Horizontal	tow	19.	28.07.81	Sta. C.	Horizontal	tow
9.	28.04.81	Sta. D.	Horizontal	tow	20.	28.07.81	Sta. D.	Horizontal	tow
10.	28.04.81	Sta. E.	Horizontal	tow	21.	28.07.81	Sta. E.	Horizontal	tow
11.	01.07.81	Sta. A.	Horizontal	tow	22.	28.07.81	Sta. F.	Horizontal	tow

All samples were collected with a 55 µm plankton net and fixed at the collecting site with formaline: final concentration 6 %. Trophi analysis were executed with the use of Eau de Javelle. The given species lists include data on relative abundance: very rare animals, (single - five specimens) are given as numbers, rare (5 - 10) = s, common (11 - 20) = h, and abundant (> 20) = sh.

4. List of rotifers from Lago Camaleão, Ilha de Marchantaria (February, April and July, 1981)

Taxon	Feb. samples	April 1 - 6	July 7 - 10 11 - 22	Taxon	Feb. samples	April 1 - 6	July 7 - 10 11 - 22
1. <i>Anuraeopsis navicula</i>	.	h	h	2. <i>Ascomorpha ecaudis</i>	.	.	s
3. <i>Ascomorpha klementi</i>	.	.	h	4. <i>Asplanchnella</i> (A.) <i>sieboldi</i>	s	sh	sh
5. <i>Bdelloidea</i> spec.	h	s	h	6. <i>Beauchampia crucigera</i>	s	.	3
7. <i>Brachionus caudatus caudatus</i>	s	h	h	8. <i>Brachionus caudatus ahlstromi</i>	.	h	.
9. <i>B. caudatus personatus</i>	s	.	h	10. <i>B. caudatus vulgatus</i>	.	sh	.
11. <i>B. dolabratus</i>	.	.	s	12. <i>B. falcatus</i>	.	h	sh
13. <i>B. patulus patulus</i>	s	s-sh	h-sh	14. <i>B. patulus macracanthus</i>	.	sh	h-sh
15. <i>B. quadridentatus</i>	.	s	s	16. <i>B. quadridentatus melheni</i>	.	s	s
17. <i>B. quadridentatus mirabilis</i>	.	.	s	18. <i>B. urceolaris amazonica</i> n. ssp.	.	s	s
19. <i>B. zahneri reductus</i>	.	.	s	20. <i>B. zahneri gessneri</i>	.	.	2
21. <i>Cephalodella forficula</i>	.	s	.	22. <i>Cephalodella gibba</i>	.	.	2
23. <i>C. paggia</i> n. sp.	.	.	2	24. <i>Colurella uncinata</i>	.	s	s
25. <i>Conochilus dossuarius</i>	.	.	s	26. <i>Dicranophorus claviger</i>	s	h	sh
27. <i>Dicranophorus caudatus braziliensis</i> 2	.	s	sh	28. <i>D. epicharis</i>	.	.	4
29. <i>Dipleuchlanis propatula</i>	.	s	s-h	30. <i>Epiphanes clavulata</i>	sh	sh	s-sh
31. <i>Epiphanes macrourus</i>	2	s	1	32. <i>Euchlanis dilatata</i>	.	.	s
33. <i>Euchlanis incisa mucronata</i>	.	h	s	34. <i>E. meneta</i>	.	.	s
35. <i>Filinia longiseta</i>	h	h	s	36. <i>Filinia longiseta limnetica</i>	.	s	s
37. <i>F. longiseta saltator</i>	h	h	sh	38. <i>F. opoliensis</i>	.	.	s
39. <i>F. pejeri</i>	4	sh	s	40. <i>Floscularia ringens</i>	.	.	5
41. <i>Floscularia ringens conifera</i>	.	.	1	42. <i>Habrotrocha angusticollis</i>	.	.	6
43. <i>Hexarthra intermedia braziliensis</i>	.	.	s	44. <i>Hexarthra mira</i>	.	h	s
45. <i>Keratella americana</i>	.	.	s	46. <i>Keratella cochlearis</i>	4	h	s
47. <i>K. lenzi</i>	.	h	h-sh	48. <i>K. nhamunda</i> nov. nom.	.	s	s
49. <i>Lecane aculeata</i>	.	.	5	50. <i>Lecane amazoniana</i> nov. nom.	.	s	s
51. <i>L. arcuata</i>	.	.	3	52. <i>L. bulla</i>	s	sh	h-sh
53. <i>L. clostercerca amazonica</i>	.	.	s	54. <i>L. cornuta</i>	s	h	h-sh
55. <i>L. crepida</i>	.	s	h	56. <i>L. curvicornis</i>	2	sh	sh
57. <i>L. curvicornis nitida</i>	.	.	s	58. <i>L. decipiens</i>	.	s	2
59. <i>L. doryssa</i>	.	s	s	60. <i>L. elachis</i>	.	2	h
61. <i>L. elegans</i>	.	.	s	62. <i>L. elsa</i>	.	2	2
63. <i>L. haliclysta</i>	.	s	s	64. <i>L. hamata</i>	.	s	s
65. <i>L. hornemanni</i>	.	2	s	66. <i>L. leontina</i>	.	h	h
67. <i>L. ludwigi</i>	.	s	s	68. <i>L. ludwigi abrupta</i>	.	s	s
69. <i>L. luna</i>	.	s	s	70. <i>L. marchantaria</i> n. sp.	.	.	h
71. <i>L. monostyla</i>	.	1	s	72. <i>L. obtusa</i>	.	s	2
73. <i>L. ohionensis</i>	.	.	1	74. <i>L. papuana</i>	sh	sh	sh
75. <i>L. pyriformis</i>	.	.	3	76. <i>L. quadridentata</i>	.	s	s
77. <i>L. proiecta</i>	.	2	.	78. <i>L. rhytida</i>	.	h	s
79. <i>L. stichaeoides</i>	.	s	s	80. <i>L. signifera ploenensis</i>	.	s	h
81. <i>L. styrax</i>	.	s	s	82. <i>L. unguata</i>	.	s	s
83. <i>L. wulferti</i>	.	s	s	84. <i>Lepadella benjamini</i>	.	3	.
85. <i>Lepadella cristata</i>	.	s	.	86. <i>L. latusinus americana</i>	.	.	3
87. <i>L. donneri</i>	.	s	s	88. <i>L. ovalis</i>	.	s	h
89. <i>L. rhomboides</i>	3	sh	h	90. <i>L. cryptopus</i>	.	.	2
91. <i>L. minoruoides</i> n. sp.	.	s	1	92. <i>L. triba</i>	.	s	s
93. <i>L. triptera</i>	.	1	1	94. <i>L. imbricata</i>	1	.	2

Taxon	Feb. samples	April 7 - 10	July 11 - 22	Taxon	Feb. samples	April 7 - 10	July 11 - 22
95. <i>Lepadella benjamini braziliensis</i>	.	1	.	96. <i>Lepadella patella</i>	.	.	1
97. <i>Limnias melicerta</i>	s	s	s	98. <i>Limnias ceratophylli</i>	h	s	s
99. <i>Lindia truncata</i>	.	.	4	100. <i>Macrochaetus collinsi</i>	.	h	h
101. <i>Manfredium eudactylotum</i>	.	s	s	102. <i>Monommata maculata</i>	.	s	s
103. <i>Monommata spec.</i>	.	s	s	104. <i>Mytilina acantophora</i>	.	s	s
105. <i>Mytilina unguipes</i>	.	.	3	106. <i>M. bisulcata</i>	.	s	s
107. <i>M. trigona</i>	.	1	3	108. <i>M. ventralis</i>	.	s	s
109. <i>M. ventralis macracantha</i>	.	s	s	110. <i>Notommata copeus</i>	.	s	s
111. <i>Notommata spec.</i>	.	s	s	112. <i>Platylas leloupi</i>	.	h	h
113. <i>Platylas leloupi latiscapularis</i>	.	s	s	114. <i>P. quadricornis</i>	.	s	s
115. <i>P. quadricornis brevispinus</i>	.	s	s	116. <i>Polyarthra vulgaris</i>	s	sh	sh
117. <i>Ptygura linguata</i>	h	s	s	118. <i>Ptygura tacita</i>	s	.	.
119. <i>P. spec.</i>	h	s	s	120. <i>Rotaria macrura</i>	.	.	1
121. <i>Rotaria neptunia</i>	s	h	sh	122. <i>R. rotatoria rotatoria</i>	h	h	s
123. <i>R. tardigrada</i>	h	s	4	124. <i>Scardidium longicaudum</i>	.	s	s
125. <i>Sinantherina socialis</i>	.	s	.	126. <i>Sinantherina spinosa</i>	.	.	s
127. <i>Synchaeta longipes</i>	4	s	sh	128. <i>Synchaeta pectinata</i>	.	.	4
129. <i>Taphrocampa selenura</i>	1	s	1	130. <i>Testudinella greeni</i>	.	.	1
131. <i>Testudinella mucronata haueriens.</i>	s	s	s	132. <i>T. mucronata</i>	.	s	s
133. <i>T. patina dendradena</i>	.	s	s	134. <i>T. patina patina</i>	h	h	h
135. <i>Trichocerca brasiliensis</i>	.	s	s	136. <i>Trichocerca bicristata</i>	.	h	s
137. <i>T. intermedia</i>	.	.	1	138. <i>T. mus</i>	.	.	1
139. <i>T. pusilla</i>	.	.	s	140. <i>T. rattus</i>	.	.	s
141. <i>T. similis</i>	.	.	h	142. <i>T. similis grandis</i>	.	s	s
143. <i>T. tenuior</i>	.	.	s	144. <i>T. tigris</i>	.	s	s
145. <i>T. voluta</i>	.	1	.	146. <i>Tripleuchlanis plicata</i>	.	.	s
147. <i>Trichotria tetractis</i>	.	s	s	148. <i>Trochosphaera aequatorialis</i>	.	h	sh
TOTAL				33	102	138	

4.1. Interpretation of species lists

The rotifer species assemblage reflects the fluctuating water levels. Despite the different number of samples per sampling period, the number of species tends to increase with the rising waters. In February, 33 taxa were found, in April, 102, and in July, 138. The total number of species identified was 148.

The composition of the rotifer taxocenose also reflects the decomposition of the terrestrial vegetation and the subsequent buildup of the aquatic plants. Only one species, *Lecane* (s. str.) *papuana* (MURRAY 1913) was present with well developed populations throughout the entire sampling period. In February, the plankton forms are dominant although the sessile forms, known from small ponds and temporary pools are also relatively abundant. The Bdelloidea rotifers present, such as *Rotaria rotatoria rotatoria* (PALLAS 1766) and *Rotaria tardigrada* (EHRENBERG 1832), are characteristic of muddy waters. The inhabitants of the periphyton are basically absent at this time. In April, besides many semi-planktonic forms, there is a development of a typical "rotten mud" assemblage represented by the Monogononta *Lepadella ovalis* (O. F. M. 1786), *Dicranophorous claviger* (HAUER 1965), *D. caudatus braziliensis* KOSTE 1972, *Brachionus patulus patulus* (O. F. M. 1786), *B. patulus macracanthus* (DADAY 1905), *Platylas leloupi leloupi* (GILLARD 1957), *Platylas leloupi latiscapularis* (KOSTE 1974), *Mytilina acantophora* HAUER 1938, *M. bisulcata* (LUCKS 1912), *M. trigona* (GOSSE 1851), *M. unguipes* (LUCKS 1912), all *Testudinella* species and the Digononta *Rotaria neptunia* (EHRENBERG 1832) and *R. rotatoria rotatoria* (PALLAS 1766). In July, the semi-planktonic forms, the swimming-creeping forms of the periphyton and the sessile species reach their maximum. These live on and among the aquatic plant mass. The following

families are represented throughout the highest water level period: Brachionidae with 19 species, Lecanidae with 35, Colurellidae with 11, Flosculariidae with 8, and Trichocercidae, with semi-planktonic forms such as *Trichocerca similis* and *T. pusilla*, with 11 species.

The species lists include some remarkable new taxa which will be discussed.

5. New species, subspecies and distribution records of rotifers

5.1. *Brachionus urceolaris amazonica* n. ssp. (Fig. 1 a - i)

Synonym: *Brachionus bennini* (LEISSLING 1924) after KOSTE 1972

This *Brachionus* was first encountered by the senior author in a sample from Igarapé Curuí, a tributary of the Rio Solimões, and erroneously identified as *B. bennini* (Fig. 1 g - h). *Brachionus urceolaris amazonica* is characterized by the previously unknown structures on the dorsal lorica which can be pronouncedly different within the same population. (Fig. 1 d - f). The ornamental granulation on the dorsal lorica, characteristic of *B. bennini*, is lacking. (Compare with DE BEA UCHAMP 1939: 9, Fig. 2 or with KOSTE 1978, T. 9, Fig. 8). Also, the number and arrangement of the anterior spines and the shape of the foot agree better with the morphological and taxonomical characteristics of *B. urceolaris*. A "dwarfing form" mentioned by GREEN (1971) was not evident. The Marchantaria population consisted of very small, uniform animals. Comparative measurements (in μm) follow:

	<i>B. urceolaris urceolaris</i> f. typ. after AHLSTROM 1940 and KOSTE 1978	<i>B. urceolaris amazonica</i> n. ssp.
lorica length	140 - 280	79 - 108
lorica width	98 - 225	78 - 83
asexual egg	98 / 75	61 / 43

Permanent slides of 3 paratypes of the new subspecies are deposited at the Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus, Amazonas, Brazil.

5.2. *Cephalodella paggia* n. sp. (Fig. 2 a - e)

Type material: 2 females from formaline sample collected by B. ROBERTSON in Lago Camaleão, Ilha de Marchantaria, on July 1, 1981. Type locality: Lago Camaleão, Ilha de Marchantaria, Amazonas, Brasil. (60° 00'N, 3° 15'S).

Cephalodella paggia is a large animal with a distinct head which narrows apically. Large bunches of cilia protrude from the bucal area and probably contain sensory hairs. Ventral side flat, dorsal slightly arched. Foot short, with distinct claws. Mastax with unclear salivary glands. Trophi symmetrical. Unci with one tooth. Rami with pincer-like termination and unclear small teeth. Upper part of fulcrum has sickle-shaped projections which support sphaerical lamellae (Fig. 2 b, e). Manubrium with short lamella and an oval ring (Fig. 2 d). Dorsal antenna normal. No special peculiarity in inner organization. No light organs found.

At first glance *C. paggia* can be confused with the large forms of *C. gibba* (WULFERT 1937), and the ring-formation on the end of the manubrium can lead to the following species: *C. misgurnus* WULFERT 1937, *C. pachyodon* WULFERT 1937, *C. tecta* DONNER 1949, and *C. obvia* DONNER 1949 (see DONNER 1949: Figs. 15 - 17). Measurements (in μm) of all these taxa are compared in the following table where F = fulcrum, Ram. = rami and Man. = manubrium. The table shows particularly the differences in the measurements of the trophi. Other taxa with rings on the manubrium such as *C. catellina* O. F. M. and *C. myersi* WISZNIEWSKI have other shapes and different toes.

	Total length	Toe length	Trophi length	F.	Ram.	Man.
<i>C. misgurnus</i> WULFERT	165 - 190	49 - 61	22	16	.	.
<i>C. pachyodon</i> WULFERT	220 - 245	55 - 60	28			
<i>C. tecta</i> DONNER	155 - 168	36	19	12	6	15
<i>C. obvia</i> DONNER	152 - 172	44 - 46	20	14	.	.
<i>C. paggia</i> n. sp.	396	126	72	43	29	50

Etymology: The species is named after Prof. Susana J. de Paggi of the Instituto Nacional de Limnologia, Santo Tomé, Argentina, in gratitude for good collaboration.

5.3. *Keratella nhamunda* nov. nom. (Fig. 3 a, b and e)

Synonym: *Keratella americana nhamundaiensis* KOSTE 1982

This taxon was first discovered in plankton samples collected by G.-O. BRANDORFF at the mouth of the Rio Nhamundá in July, 1975. It was associated by KOSTE (BRANDORFF et al. 1982) to the *Keratella americana* CARLIN 1943 species group as a new subspecies (Fig. 3c). In this species group, however, the hind median facet of the dorsal lorica is open, and in the new taxa (Fig. 3a, b) this facet is closed, points downwards, and ends in a ridge parting to the left, which divided two asymmetrical caudal plaques. Similar, although symmetrical, configuration of the caudal facet is found in *Keratella procurva* (THORPE 1891). (Fig. 3d), which was not encountered in the study area. *K. procurva* has been found in the Neotropics in Argentina (PAGGI 1973), Panama and Venezuela. It has a pair of hind spines of which the left is always shortened or lacking. It is possible that, from a morphological point of view, *K. nhamunda* represents a phylogenetic link between the species groups *K. americana* and *K. procurva*. The distinctiveness of *K. nhamunda* is reinforced by the surface of the dorsal lorica being covered by fine, wave-like, longitudinal striations (Fig. 3e), a taxonomical character not observed in other *Keratella* species. We therefore consider *K. nhamunda* to be a good species. Its name derives from its first collecting site, Rio Nhamundá. (For other information concerning the *Keratella* taxa see AHLSTROM 1943 and KOSTE 1979).

5.4. *Lecane* (s. str.) *amazoniana* n. sp. (Fig. 5 a - c)

Synonyms: *Lecane rhytida* after HAUER 1965. — *Lecane* sp. 1 after HAUER 1965. — *Lecane rhytida* after KOSTE 1972. — *Lecane stichaea* var. *amazonica* after KOSTE 1978.

There is still a great deal of confusion with respect to this taxon found in the Amazon and misidentified by HAUER (1965). Our comparative morphological investigation permitted us to verify that this *Lecane* is very different from *L. rhytida* (HARRING & MYERS 1926). (Compare Fig. 4, which was drawn from a Marchantaria specimen, with H & M 1926, Plate XX, Fig. 3 - 4). *Lecane rhytida* has extremely long tips of toes, but no claws or pseudoclaws. *L. amazoniana* has pseudoclaws which are sharply indented on the outer edge of the toes. Furthermore, while the margin of the lorica between the anterior corner spines in *L. rhytida* is concave, in *L. amazoniana* it is straight. *L. amazoniana* also has special distinct characteristics when compared to the *L. stichaea* group (see KOSTE 1978). The following table (measurements in μ m) shows this distinctiveness.

	<i>L. stichaea</i>	<i>L. amazoniana</i> n. sp.
Ventral lorica length		
after PEJLER 1962	90 - 105	
after H. & M. 1926	105	
after KOSTE 1978	75 - 105	87
Dorsal lorica length		
after H. & M. 1926	92	
after KOSTE 1978	70 - 85	72 - 78

	<i>L. stichaea</i>	<i>L. amazoniana</i> n. sp.
Ventral lorica width	58	50 - 53
Dorsal lorica width	69 - 76	58 - 60
Toe length	27 - 39	36
Claw length	5 - 7	12 - 14
Claw form	bent backwards, only inside edge indented by weak step	straight, outer edge indented by sharp step
Anterior lorica	margin between anterior spines convex	margin between anterior spines straight

The new *Lecane* species from Marchantaria is slimmer and has a relatively shorter dorsal lorica. The toes are long and straight with needle-like pseudoclaws indented on the outer edge. This species has also been found in black waters, Lago Jurucuí, Rio Tapajós and now in the Rio Solimões. It is not yet known from other tropical areas.

5.5. *Lecane* (s. str.) *aspasia amazonica* n. ssp. (Fig. 6 a - c)

Lecane aspasia was first described by MYERS (1917) from material collected in the surroundings of Los Angeles, California, and since then there have not been any more records. It is possible that *L. aspasia* has been overlooked up until now because it occupies the same habitat as *L. signifera ploenensis* (VOIGT 1902), and also because it presents similar toes and pattern on the dorsal lorica to *L. stichaeoides* (Fig. 11 a, b). The new subspecies is slimmer than the forma typica, has longer toes, and long, sharply indented pseudoclaws. Compare the *L. aspasia* forms from Ilha de Marchantaria (Fig. 6 a - c), with those of HARRING & MYERS (1926). These figures and measurements show that, based on the previously cited morphological differences, one should differentiate this new record as a new subspecies. (For more information about *L. stichaeoides* HAUER 1938 see section 5.7.). Comparative measurements (in μ m) follow:

	<i>L. aspasia</i> typ.	<i>L. aspasia amazonica</i> n. ssp.
Dorsal lorica length	82	101
Dorsal lorica width	75	73
Ventral lorica length	94	111
Ventral lorica width		58
Toe length	38	49
Claw length	8	11

5.6. *Lecane* (*Monostyla*) *marchantaria* n. sp. (Fig. 7 a - d)

The *Lecane* (*Monostyla*) subspecies contains a great number of species, but one particular group, which lacks claws on the toes can be differentiated, and the new *Lecane* (*M.*) species belongs to this group. It is somewhat similar to the big forms of *L. (M.) decipiens* (DADAY 1913) (Fig. 10) and *L. (M.) arcuata* (BRUCE 1891), and when compared to the *L. (M.) arcuata* specimen from Bung Borapet, Thailand (Fig. 9), one is also tempted to associate this taxon to the *L. hamata* species group (STOKES 1896), (see Fig. 8 a, b), because of the retraction of the anterior margin of the lorica. The new species differs, however, from these two *Lecane* and their variations, not only because of differences in the apical region of the lorica, but also because of its measurements (see table below).

Description: The lorica is egg-shaped, and the anterior margin of the ventral lorica is more deeply indented (up to 22 μ m) than the dorsal lorica (up to 14 μ m). The anterior tips of the dorsal lorica do not extend into the ventrally indented head section as in *L. hamata* (Fig. 8 a, b), but run parallel with those of the ventral lorica and present, anteriorly, a small hook-like structure which is bent ventrally. The first segment of the foot is small and rectangular. The second, where the relatively long toes are

inserted, is broad, thickened and oval in outline. The toe is straight, with parallel sides and only in the last third is it pointed. Comparative measurements (in μm) of *L. (M.) marchantaria* and similar species follow: (Vr. = distance between the anterior spines, Dpz. Vr., +, = spines of the anterior dorsal lorica visible in the ventral aperture, Dpz. Vr., -, = spines not visible in ventral aperture).

	Total length	Ventral lorica length	Dorsal lorica length	Ventral lorica width	Dorsal lorica width	Toe length	Vr.	Dpz. Vr.
<i>L. (M.) arcuata</i> (BRYCE 1891) after VOIGT 1957	83 - 100	60 - 73	45 - 69	41 - 50	49 - 63	23 - 28	?	-
<i>L. (M.) arcuata</i> after HAUER 1935	92	72	67	44	55	25	23	-
<i>L. (M.) arcuata</i> after HARRING & MYERS 1926	90	68	60	44	54	24	24	-
<i>L. (M.) arcuata</i> after PAX & WULFERT 1941	-	97	80	56	70	35	-	-
<i>L. (M.) hamata</i> typ. after KOSTE 1978	-	77 - 98	61 - 88	40 - 60	52 - 66	26 - 38	?	+
<i>L. (M.) hamata</i> f. <i>arcuata</i> after WULFERT 1966	100	70	52	40	56	28	25	+
<i>L. (M.) marchantaria</i>	133 - 148	95	90	50	72	43	14	-

Permanent slides of the holotype and 4 paratypes are deposited at INPA, Manaus, Amazonas, Brazil.

5.7. *Lecane* (s. str.) *stichaeoides* HAUER 1938 (Fig. 11 a, b)

Synonyms: *Lecane stichaea* f. *stichoides* (HAUER 1938) after KOSTE 1978. - *Lecane* (s. str.) *stichaea* (partim) after KUTIKOVA 1970. - *Lecane aspasia* MYERS 1917. - *Lecane stichaea* after KOSTE 1981.

This *Lecane* species was described by HAUER in 1938 from a single specimen collected in a rice field near Singkarak, Sumatra (see KOSTE 1981 : 1903). HAUER (1937/38) erected the new species "stichaeoides" because of its smaller size, thinner shape and particularly because of a totally different arrangement of the ornamental ridges on the dorsal and ventral lorica, when compared to *L. stichaea*. While HAUER did not comment on the insertion of the claws, it is clearly shown in the very good figure of his South East Asian record. As we have already seen in the discussion of *L. amazoniana* n. sp., *L. stichaea* and similar forms always present a characteristic insertion of the claws: a soft indentation on the inner side of the toes. *L. stichaeoides* also show distinctly indented toes, but on both sides. HAUER also did not mention *L. (s. str.) aspasia*, which is similar to *L. stichaeoides*, and had already been described by MYERS in 1917. (Synonyms ?). Compilation of comparative measurements (in μm) follow:

	<i>L. stichaeoides</i> after HAUER 1937/38	<i>L. aspasia</i> after HARRING & MYERS 1926	<i>L. stichaeoides</i> specimen from Marchantaria
Dorsal lorica length	74	82	79
Dorsal lorica width	55	75	68
Ventral lorica length	81	94	83
Ventral lorica width	48	-	54
Anterior lorica width	61	63	58
Toe length	32	38	33
Claw length	7	8	7

Small forms of *L. stichaeoides* can be confused with *L. aculeata aculeata* (JAKUBSKI 1912), but in our material, *L. aculeata aculeata* (Fig. 12) presents the anterior spines pointed outward, and the following measurements: ventral lorica length - 61 μm , ventral lorica width - 43 μm , dorsal lorica length - 57 μm , dorsal lorica width - 54 μm , anterior lorica width - 46 - 47 μm , toe length - 22 - 25 μm , and claw length - 5.5 - 6 μm .

5.8. *Lepadella* (L.) *minoruoides* n. sp. (Fig. 13 a - g)

In cross section the lorica is triangular and 36 μm high (Fig. 13 e). Outline is broad anteriorly, tapering to the middle of the foot opening, and ending posteriorly in a slightly rounded tip. Ventrally, the opening of the head is deep. Dorsally, it is slightly surpassed by the apical end of the thin dorsal keel which appears as a distinct notch. The foot opening is oval with posteriorly directed margins. Foot composed of 1 non-movable and 3 movable sections. Toes straight and pointed. The dorsal lorica is covered with parallel, longitudinal rows of cylindrically shaped rods, (Fig. 13 f), each of which stands on a flat, rounded base. Lateral view (Fig. 13 b) shows an arched keel, which, in the direction of the head, slopes steeply, and posteriorly in a slightly S-shaped curve.

The new species belongs without doubt to the *triptera* form group (KOSTE 1978: 192). Up to now, only *L. triptera* forms show spore, pearl, hump or bubble-shaped structures. (KOSTE 1981: 112), and while similar rows of rods are found on the dorsal lorica of *L. minorui* KOSTE 1981, they also present wing-like prominences. One should add that the *L. triptera* identified by KUTIKOVA (1962: 476, Fig. 3) from the Luga District in East Europe, shows pearl-shaped structures which concentrate on both sides of the dorsal keel (compare with DONNER 1954: 90, Fig. 21 a - b). These forms, however, lack the constriction on either side of the foot opening. Comparative measurements (in μm) follow:

	lorica length	lorica width	toe length	foot opening
<i>Lepadella triptera</i> (EHRB.) after DONNER 1954	66	56	-	-
<i>L. triptera</i> (EHRB.) after KUTIKOVA 1962	66	57	20	-
<i>L. minorui</i> after KOSTE 1981	72 - 80	76 - 80	24	20/16
<i>L. minoruoides</i> n. sp.	72	65	25	18/14

Permanent slides of the holotype are deposited at INPA, Manaus, Amazonas, Brazil.

5.9. *Manfredium eudactylotum* (GOSSE 1886)

Synonyms: *Scaridium eudactylotum* GOSSE 1886. - *Eudactylota eudactylota* (GOSSE 1886) after MANFREDI 1927. - *Beauchampiella eudactylota* (GOSSE 1886) after GALLAGHER 1957. - *Beauchampiella eudactylota* after BRANDORFF et al. 1982. - *Manfredium eudactylotum* (GOSSE 1886) after DE RIDDER 1981.

In previous publications of rotifers from the Amazon, HAUER (1965) used the genus name *Eudactylota* while KOSTE (1972) and others used the name *Beauchampiella*. In studies of the nomenclature of this taxa, DE RIDDER (1981) points out that *Eudactylota* MANFREDI (1927) is not available because there exists an *Eudactylota* WALSINGHAM 1911 (Lepidoptera). Also, the genus name *Beauchampiella*, introduced by REMANE (1929), is a nomen nudum. Therefore GALLAGHER's proposal of the genus name *Manfredium* is correct. *M. eudactylotum* occurred frequently in the samples and some specimens with toe lengths of 360 μm , reached an overall length of 760 μm . (In reference to *Eudactylota wulferti* HAUER 1965 = *M. eudactylotum* (GOSSE) f. *wulferti* HAUER 1965, after KOSTE 1978, see BRANDORFF et al. 1982: 77, Fig. 2).

5.10. *Mytilina trigona* (GOSSE 1851) (Fig. 15 a - c)

This rotifer is known from various publications and is an inhabitant of the mud surfaces of small bodies of water. It was recorded by MURRAY (1913) from brackish water ponds near Rio de Janeiro, but this is the first record for the Amazon region. The species is characterized by the lorica being somewhat triangular in cross section (Fig. 15 c) and presenting, at the tip of the lorica, a notch through which a thin median keel is visible. The toes are straight and slightly thickened near the tips. Measurements from the literature give a lorica length of 150 - 160 μm and toe lengths of 68 - 83 μm . The Marchantaria *M. trigona* shows a lorica length of 186 μm and toe lengths of 75 - 80 μm .

5.11. *Mytilina unguipes* (LUCKS 1912) ? (Fig. 14 a, b)

Synonym: *M. crassipes* (LUCKS 1912) ?

Due to the very often short descriptions and unsatisfactory figures of older authors, until today, there exists a great deal of uncertainty in reference to the soft-skinned *Mytilina*. This is particularly true for *M. crassipes* (LUCKS 1912), *M. bisulcata* (LUCKS 1912), *M. unguipes* (LUCKS 1912), *M. videns* (LEVANDER 1894), and *M. compressa* (GOSSE 1851). All of them live on mud surfaces. *M. bisulcata* was recorded for South America by MICHELANGELO et al. (1980) from Venezuela. Unfortunately, however, the species appears only in a table and nothing more is said about it. The Marchantaria *M. unguipes* is the first record for this geographical region.

Based on the form of the toes one can separate two groups of these animals:

a) Toes long, thin, straight or slightly bent, somewhat pointed at the tip: *Mytilina trigona* (GOSSE 1851) (see section 5.10), *M. videns* (LEVANDER 1894), *M. bisulcata* (LUCKS 1912) (see BRANDORFF et al. 1982: 80, Fig. 15 - 16), *M. compressa* (GOSSE 1851).

b) Toes long, thin, straight or slightly bent, ending in soft, flexible claws: *M. crassipes* (LUCKS 1912) (lorica length - 138 μm , toe length - 57 - 75 μm , claw - 9 μm), *M. unguipes* (LUCKS 1912) (see KOSTE 1978, Tab. 41, Fig. 2 a, b) (lorica length - 193 μm , toe length - 58 μm , claw - 13 μm).

As shown in Fig. 14, the specimens from Lago Camaleão apparently are the soft-skinned *M. unguipes* (LUCKS 1912). They could be juveniles of *M. crassipes*, but the integument of *M. crassipes* is more reinforced. Measurements: lorica length - 114 μm , lorica width - 40 μm , lorica height - 58 μm , toe length - 65 μm , claw - 7 μm .

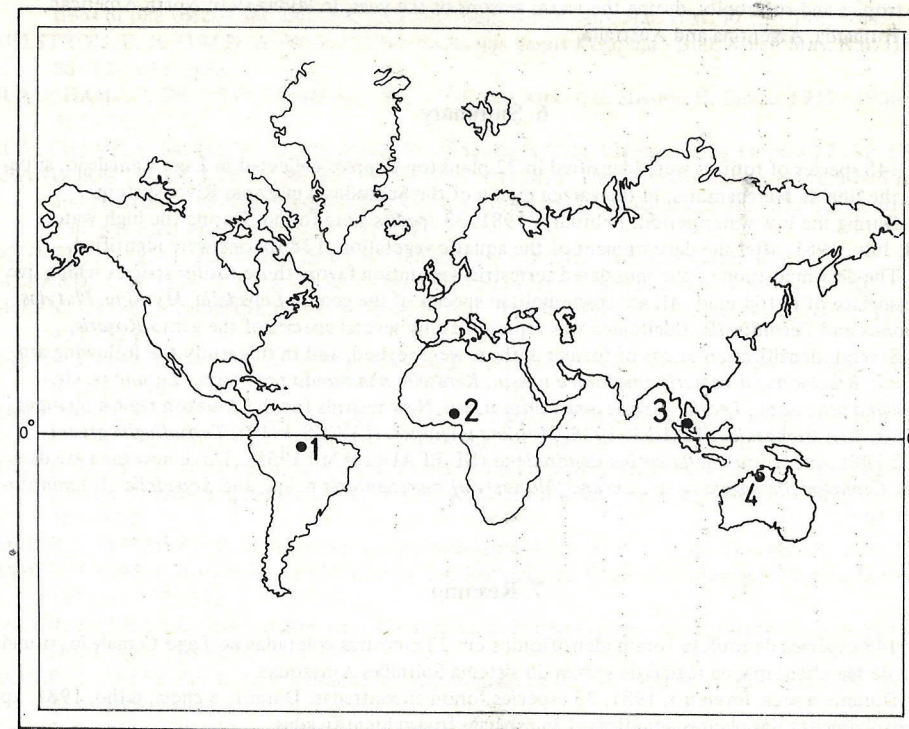
5.12. *Testudinella greeni* KOSTE 1981 (Fig. 19)

Synonyms: *Testudinella tridentata* SMIRNOV f. *curvata* n. f. after WULFERT 1965. - *T. tridentata curvata* (WULFERT 1965) after KOSTE 1978. - *T. tridentata curvata* WULFERT after FERNANDO & ZANKAI 1981.

For the description of this species see KOSTE (1981: 116, Tab. 5). Only one specimen was found in our samples. This is the first record for the Neotropics, and now proves that this rare rotifer occurs pantropically. In reference to the distribution of *T. greeni* KOSTE 1981 see Map. 2. The lorica measurements of this large *Testudinella* follow: length - 324 μm , width - 148 μm .

5.13. *Testudinella patina dendradena* (DE BEAUCHAMP 1955) (Fig. 17 b)

Testudinella species were remarkably numerous in the Marchantaria samples, among them, *T. mucronata haueriensis* (GILLARD 1967) forms with blunt tips on the anterior margin of the dorsal lorica (Figs. 17 a and 18). This abnormality has little taxonomical value; they are probably juvenile specimens. Among the smaller *Testudinella* species, *T. patina patina* (Fig. 17 c) and *T. patina dendradena* were found. The latter was described by DE BEAUCHAMP (1955) from samples of the Ivory Coast, West Africa, and more recently, by MICHELANGELO et al. (1980) from Venezuela. This *Testudinella* subspecies differs anatomically from the type in its ramified, string-shaped vitellarium. The dorsal lorica also has a characteristic anterior margin (Fig. 17 b). This is the first record for the Amazon region.



Map 2:

Pantropical distribution of *Testudinella greeni* KOSTE 1981 (1 - Lago Camaleão, Amazonas, Brazil; 2 - Socoto River, Nigeria, Africa; 3 - ricefield near Penang, Malaysia; 4 - Magela Creek, tributary of Alligator River, Australia, N. T.).

5.14. *Trochosphaera aequatorialis* SEMPER 1872

This interesting species, which has evolved entirely towards a pelagial life, was previously known in the Neotropics only from Lake Brokopondo, Surinam (LENTVAAR 1975), Lago Jacaretinga, Amazonas (KOSTE 1976), and Lagunas del Valle, Rio Paraná, Argentina (PAGGI 1978). In 1976 KOSTE studies the morphology and anatomy of both *T. aequatorialis* and *T. solstitialis* (THORPE 1893). These differ in the localization of the "wheel organ" which is often difficult to define. Both species are ovoviparous and the resting eggs have similar complicated morphological characters (Fig. 16 c). Similar trophi, with very many small unci teeth, indicate they are microphagous. The sexual period of *T. solstitialis*, from Texas, has been discussed by McCULLOUGH & LEE (1980). *T. aequatorialis* is probably similar. In Lago

Camaleão this species occurred, with both, sexual and asexual eggs, (Fig. 16 b, c), only during the high water level period. Males were not recognized in these samples fixed with formaline. *Trochosphaera* develops large populations in warm waters with poor oxygen conditions. They can also be found, out of the tropics and subtropics, during the warm seasons of the year, in Midwestern North American, China, Rumania, Argentina and Australia.

6. Summary

148 species of rotifers were identified in 22 plankton samples collected in Lago Camaleão, situated on the Ilha de Marchantaria, in the varzea region of the Solimões-Amazonas River system.

During the low water period, February, 1981, 33 species were found. During the high water period, July, 1981, after the development of the aquatic vegetation, 138 species were identified.

The decomposition of the inundated terrestrial vegetation favors those rotifer species which live on the surface of putrid mud. All are cosmopolitan species of the genera *Lepadella*, *Mytilina*, *Platylas*, *Brachionus* and *Testudinella*. Bdelloidea was represented by several species of the genus *Rotaria*.

Several identification errors of former authors were revised, and in this study the following are proposed: *Brachionus urceolaris amazonica* n. ssp., *Keratella nhamunda* nov. nom., *Lecane* (s. str.) *amazoniana* nov. nom., *Lecane aspasia amazonica* n. ssp. New records for the Amazon region include: *Lecane* (s. str.) *stichaeoides* HAUER 1938, *Mytilina unguipes* (LUCKS 1912), *Testudinella greeni* KOSTE 1981, and *Testudinella patina dendradena* (DE BEAUCHAMP 1955). Three new taxa are described: *Cephalodella paggia* n. sp., *Lecane* (*Monostyla*) *marchantaria* n. sp., and *Lepadella* (L.) *minoruoides* n. sp.

7. Resumo

148 espécies de rotífera foram identificados em 22 amostras coletadas no Lago Camaleão, situada na Ilha de Marchantaria, na região de várzea do sistema Solimões-Amazonas.

Durante a seca, fevereiro, 1981, 33 espécies foram encontradas. Durante a cheia, julho, 1981, após o desenvolvimento das plantas aquáticas, 138 espécies foram identificadas.

A decomposição da vegetação terrestre inundada favorece aquelas espécies de rotíferos que habitam a superfície de lama putrefata. Todas são espécies cosmopolitas, representantes dos seguintes gêneros: *Lepadella*, *Mytilina*, *Platylas*, *Brachionus* e *Testudinella*. Bdelloidea foi representada por várias espécies de *Rotaria*.

Equívocos de outros autores foram revisados, e propõem-se neste trabalho: *Brachionus urceolaris amazonica* n. ssp., *Keratella nhamunda* nov. nom., *Lecane* (s. str.) *amazoniana* nov. nom., *Lecane* (s. str.) *aspasia amazonica* n. ssp. Espécies novas para a região são: *Lecane* (s. str.) *stichaeoides* HAUER 1938, *Mytilina unguipes* (LUCKS 1912), *Testudinella greeni* KOSTE 1981, e *Testudinella patina dendradena* (DE BEAUCHAMP 1955). Três novas espécies são descritas: *Cephalodella paggia* n. sp., *Lecane* (*Monostyla*) *marchantaria* n. sp., e *Lepadella* (L.) *Minoruoides* n. sp.

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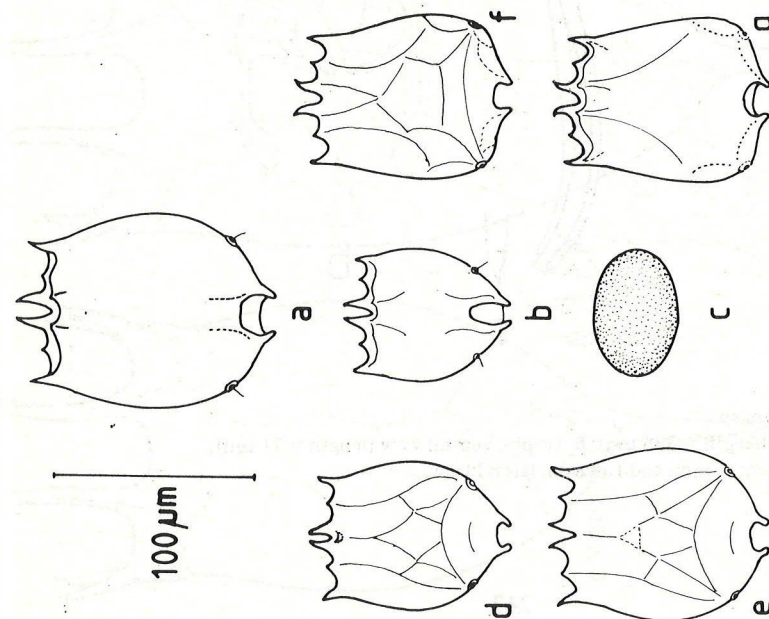
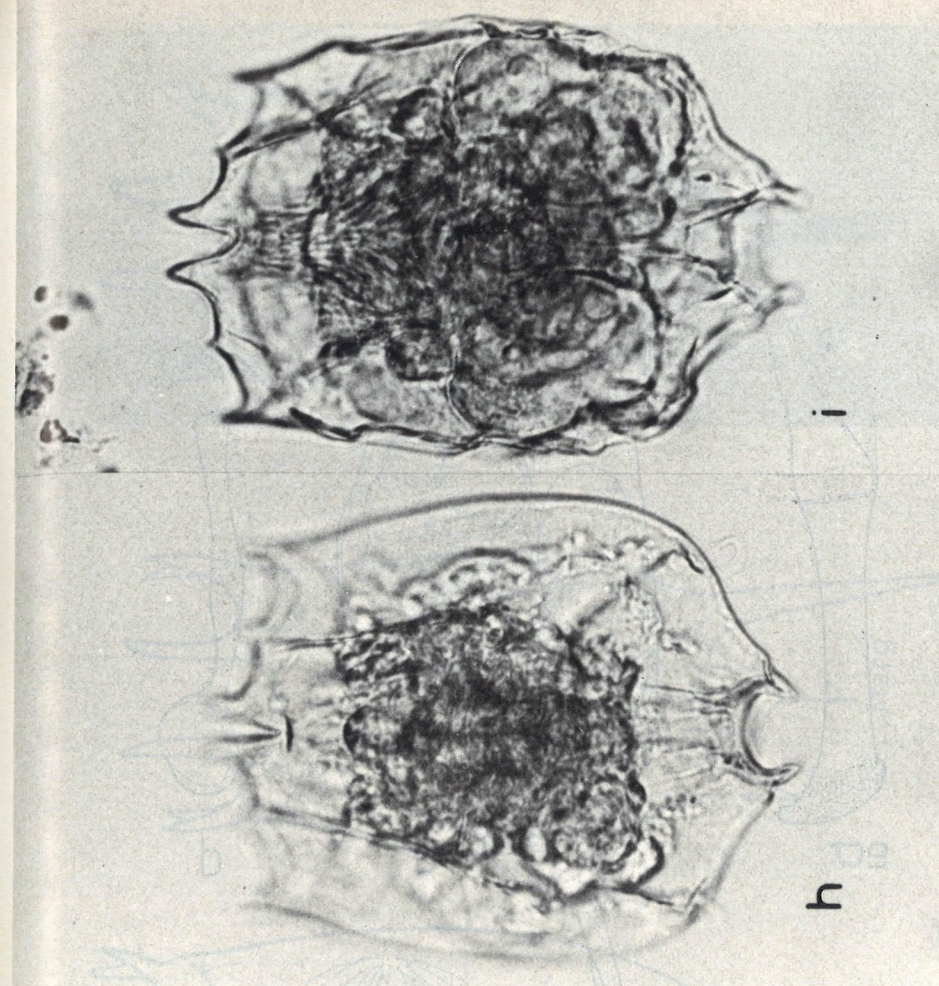


Fig. 1:
Brachionus urceolaris amazonica n. ssp.
a. adult specimen, ventral view; b. juvenile, ventral view; c. asexual egg (61/43 μm); d - f. different dorsal views; g. specimen from Igarapé Curui, ventral view; h. dorsal view; i. specimen from Lago Camaleão, ventral view.

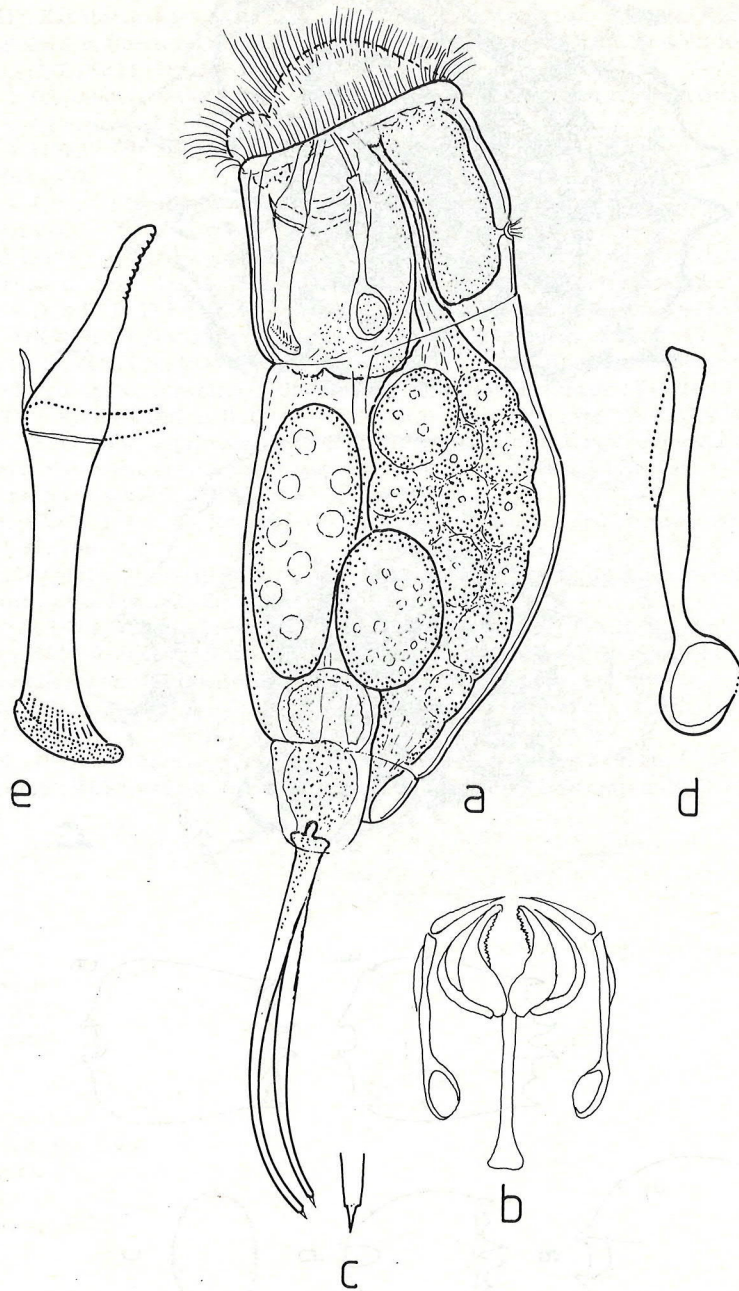


Fig. 2:
Cephalodella paggia n. sp.
a. lateral view (total length = 396 μ m); b. trophi, ventral view (length = 71 μ m);
c. claw; d. manubrium; e. rami and fulcrum, lateral view.

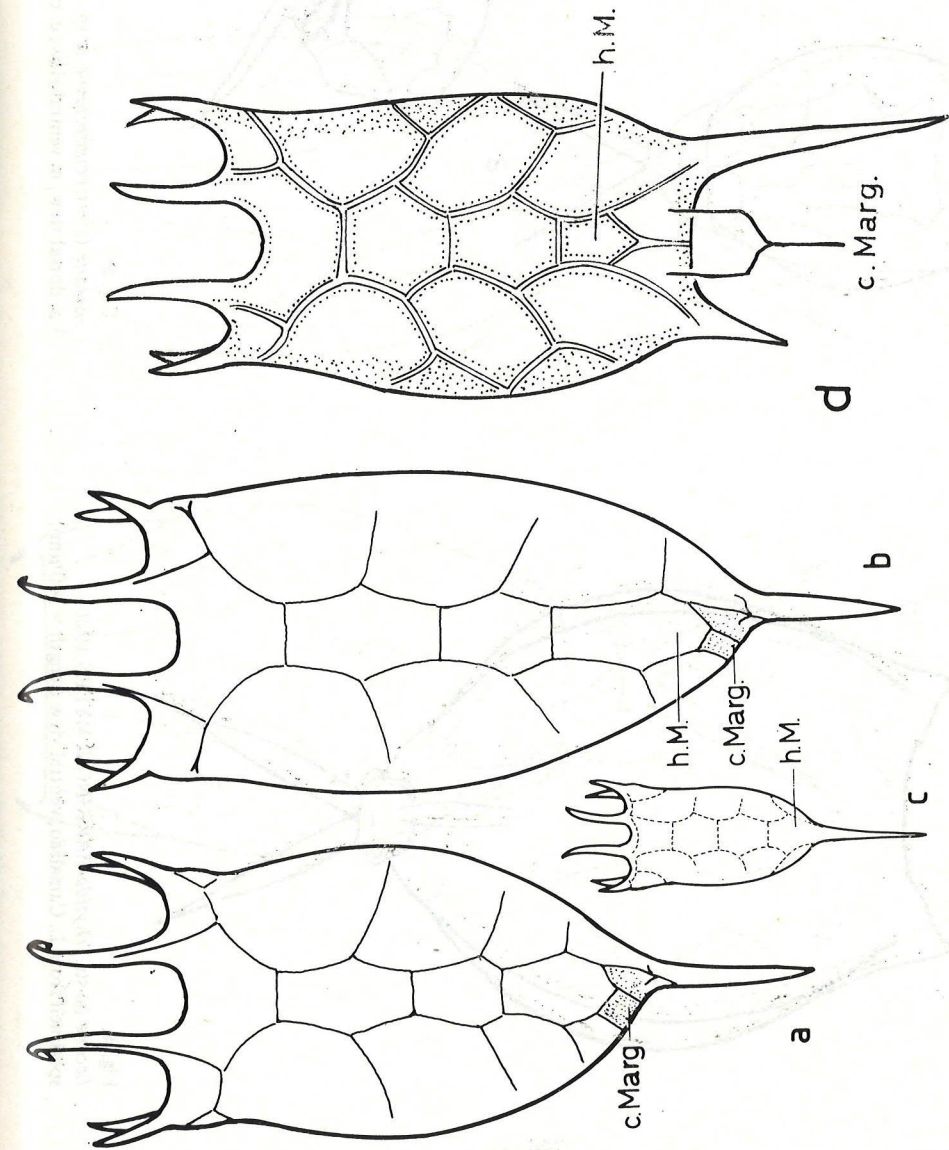


Fig. 3:
Keratella nhamunda n. sp.
a. dorsal view (length = 209 μ m), (c. marg. = caudal margin facet, punctate); b. dorsal view (length = 210 μ m); c. *Keratella americana* CARLIN 1943 (length = 220 μ m), (h. m. = hind median facet); d. *Keratella procurva* THORPE 1891, (length = 180 μ m); e. *K. nhamunda* n. sp. dorsal lorica with wave-like longitudinal striations.

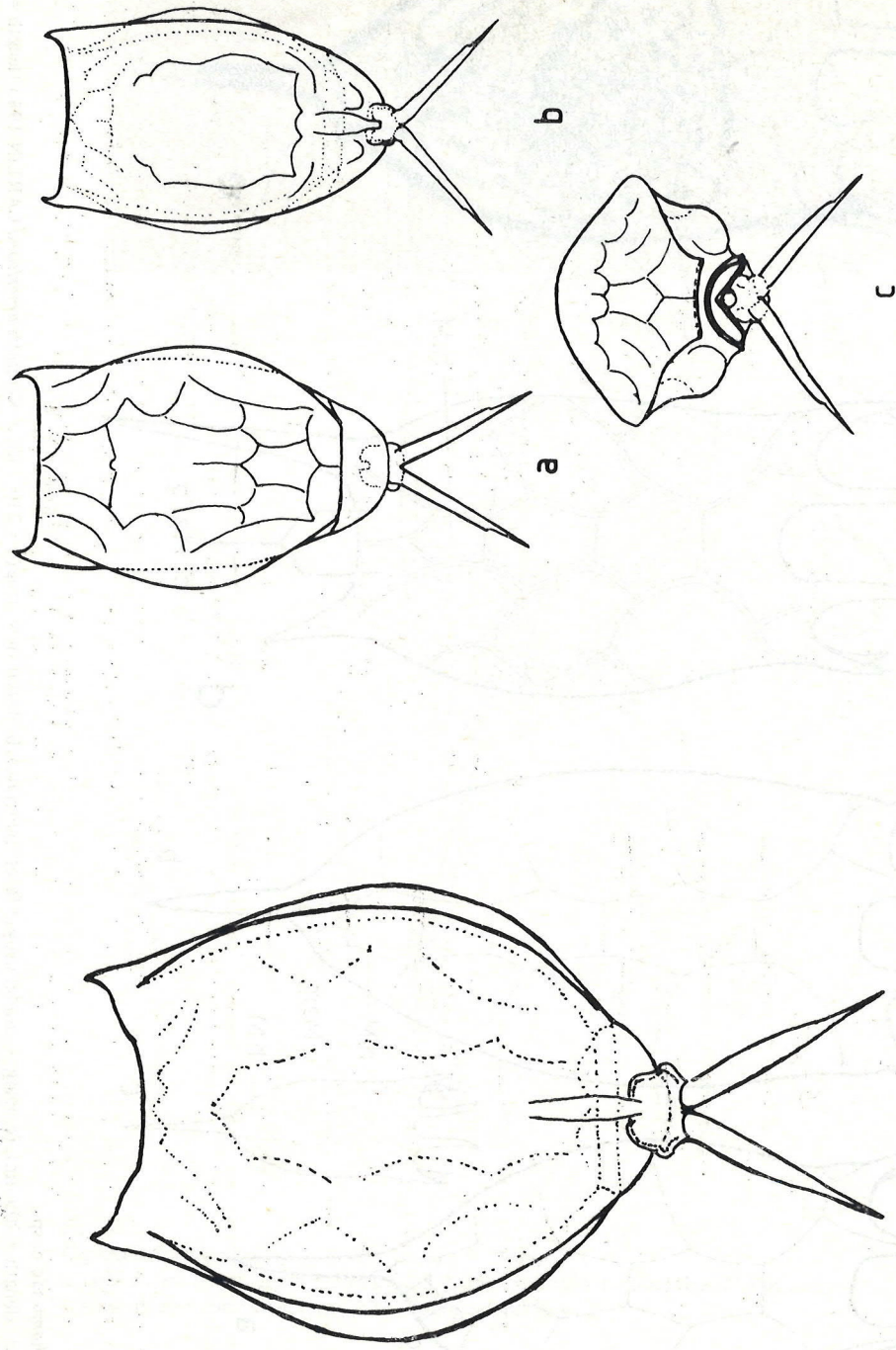


Fig. 4:
Lecane (s. str.) *rhytida* HARRING & MYERS 1926
specimen from L. Camaleão, ventral view (length = 140 μ m).

Fig. 5:
Lecane (s. str.) *amazoniana* n. sp.
a. dorsal view; b. ventral view; c. caudal view.

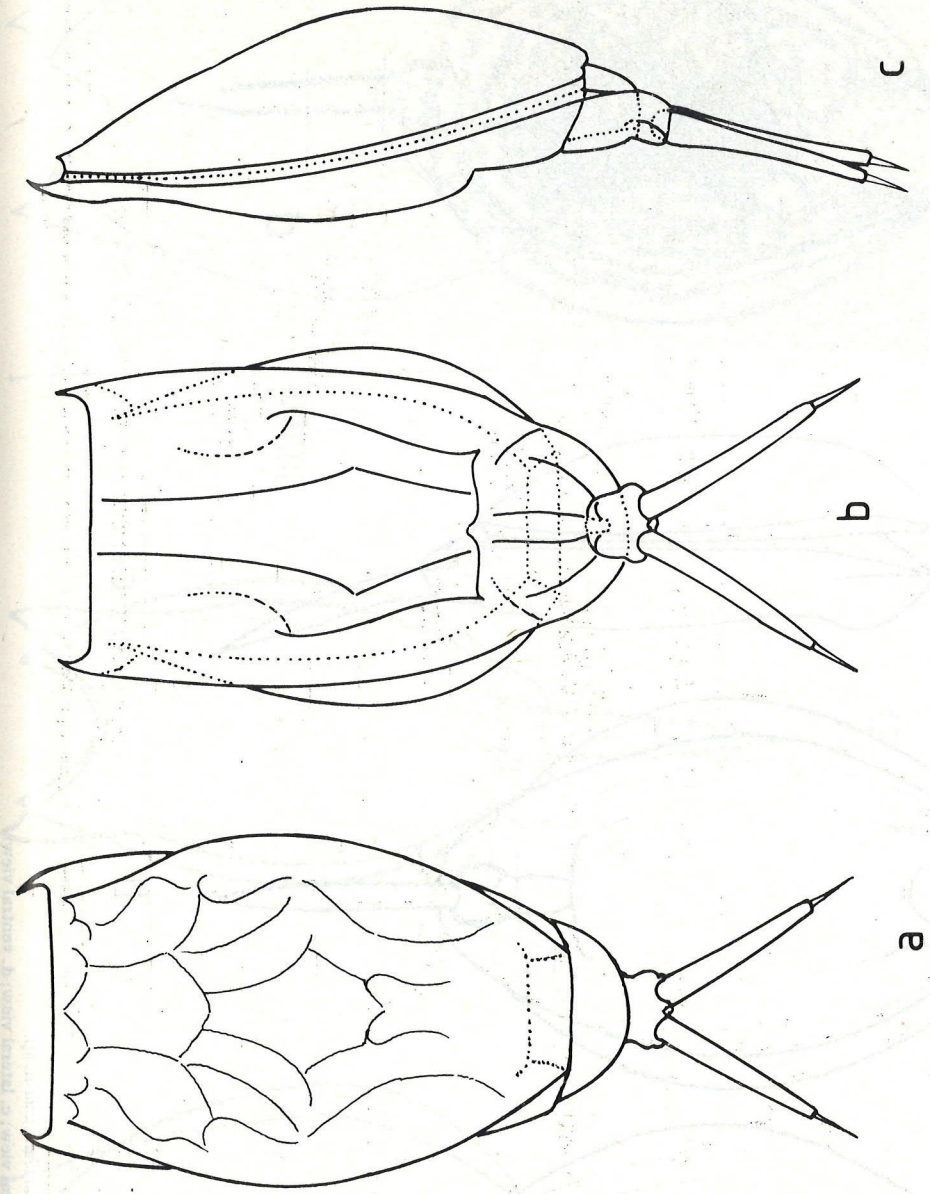


Fig. 6:
Lecane (s. str.) *aspasia amazonica* n. ssp.
a. dorsal view; b. ventral view; c. lateral view.

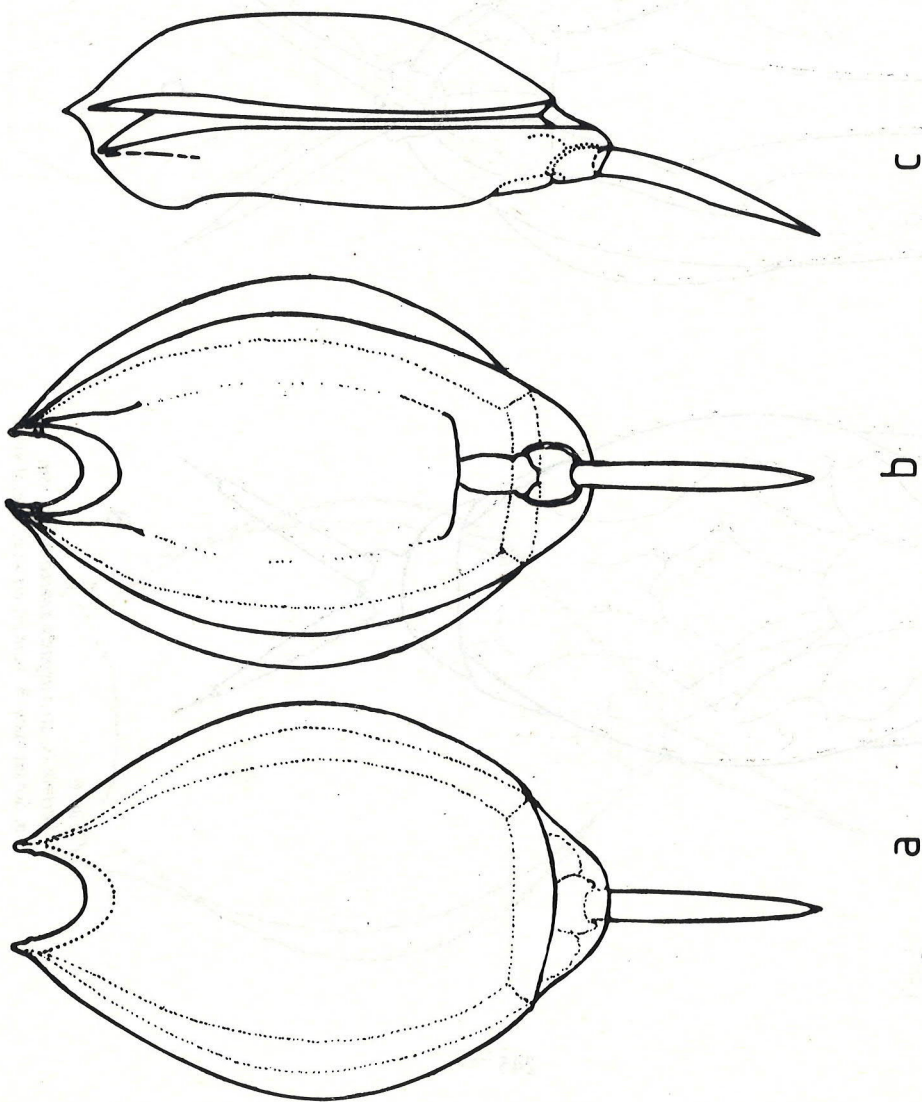
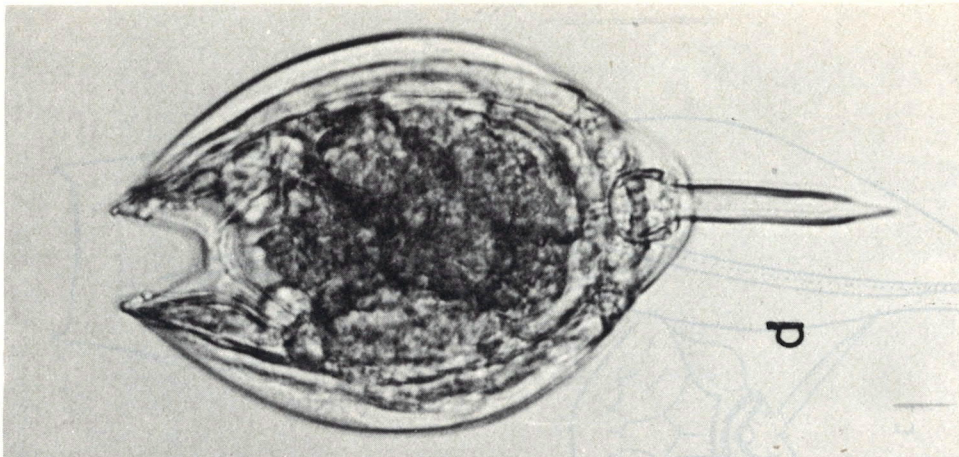


Fig. 7:
Lecane (Monostyla) marchantaria n. sp.
a. dorsal view; b. ventral view; c. lateral view; d. ventral view.

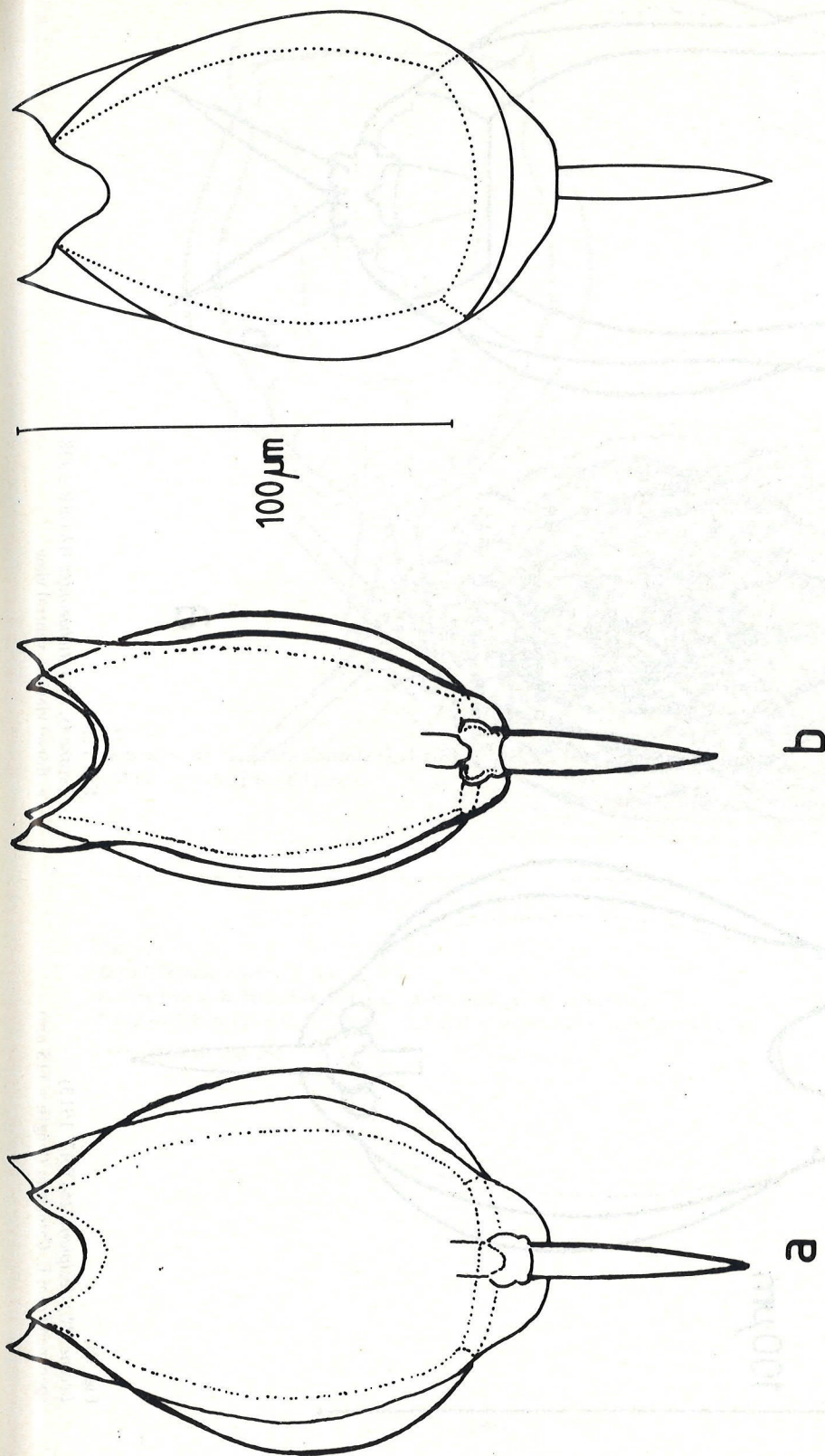


Fig. 8:
Lecane (M.) hamata hamata (Stokes 1896)
a. specimen from L. Camaleão, ventral view (length = 79 μm);
b. specimen from Igarapé Mapiri, near Santarém, small form.

Fig. 9:
Lecane (M.) arcuata (Bryce 1891)
specimen from Bung Borapet, Thailand,
dorsal view (length = 176 μm).

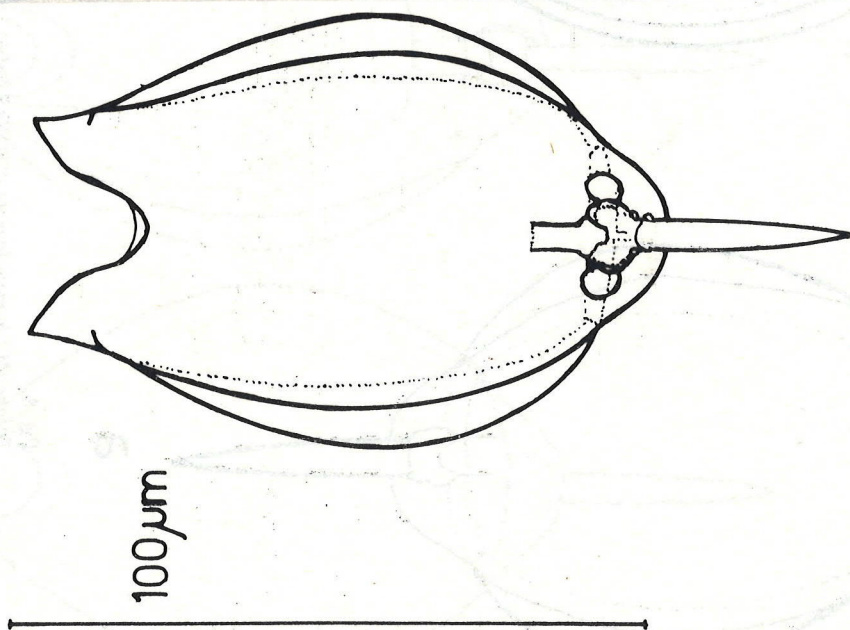
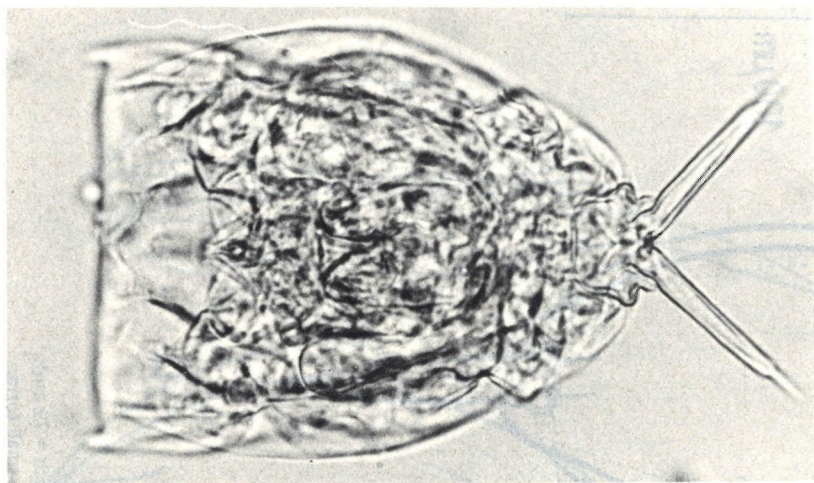
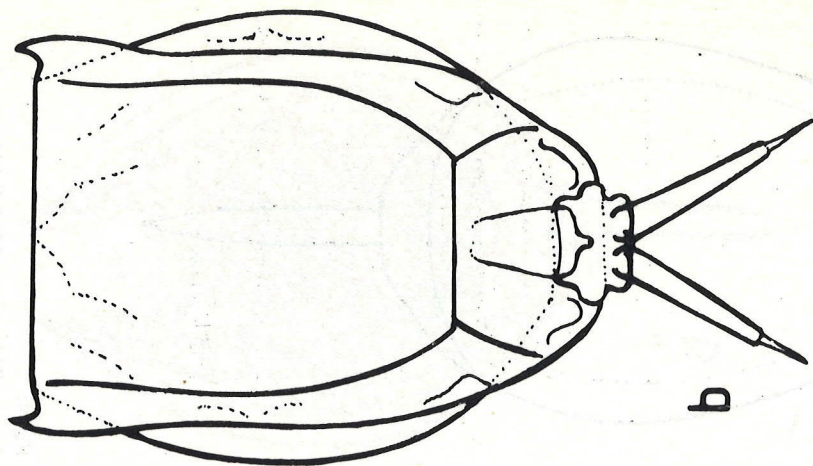


Fig. 10:
Lecane (M.) decipiens (DADAY 1913)
specimen from L. Camaleão (length = 115 μm).



a



b

Fig. 11:
Lecane (s. str.) stichaeoides HAUER 1938
a. dorsal view; b. ventral view.

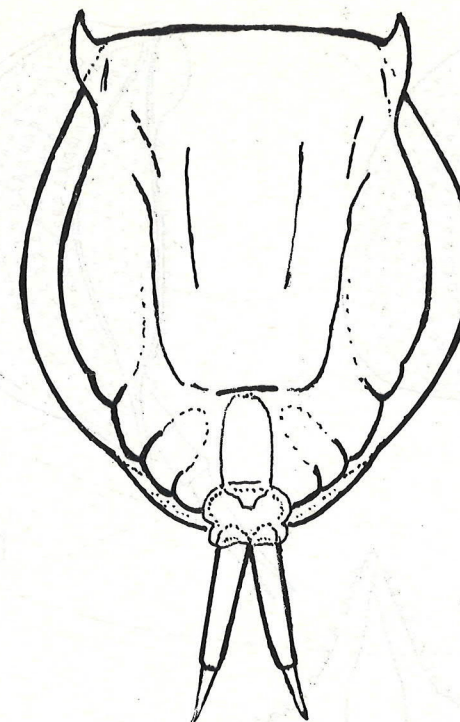
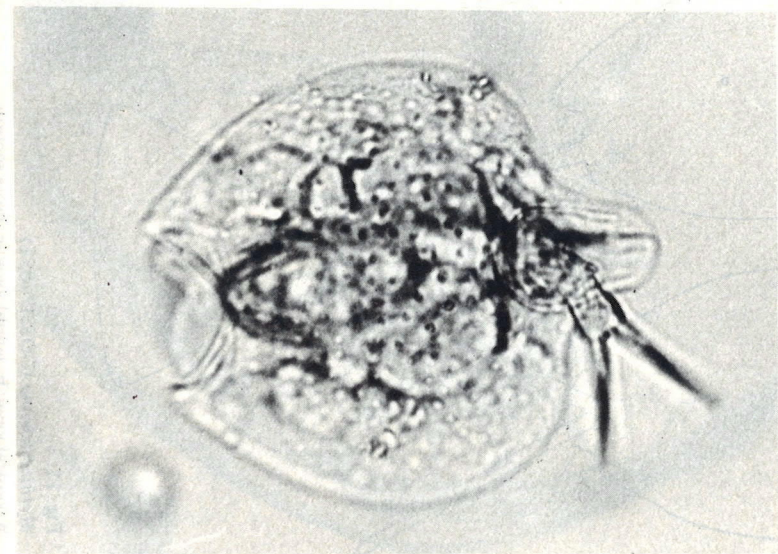
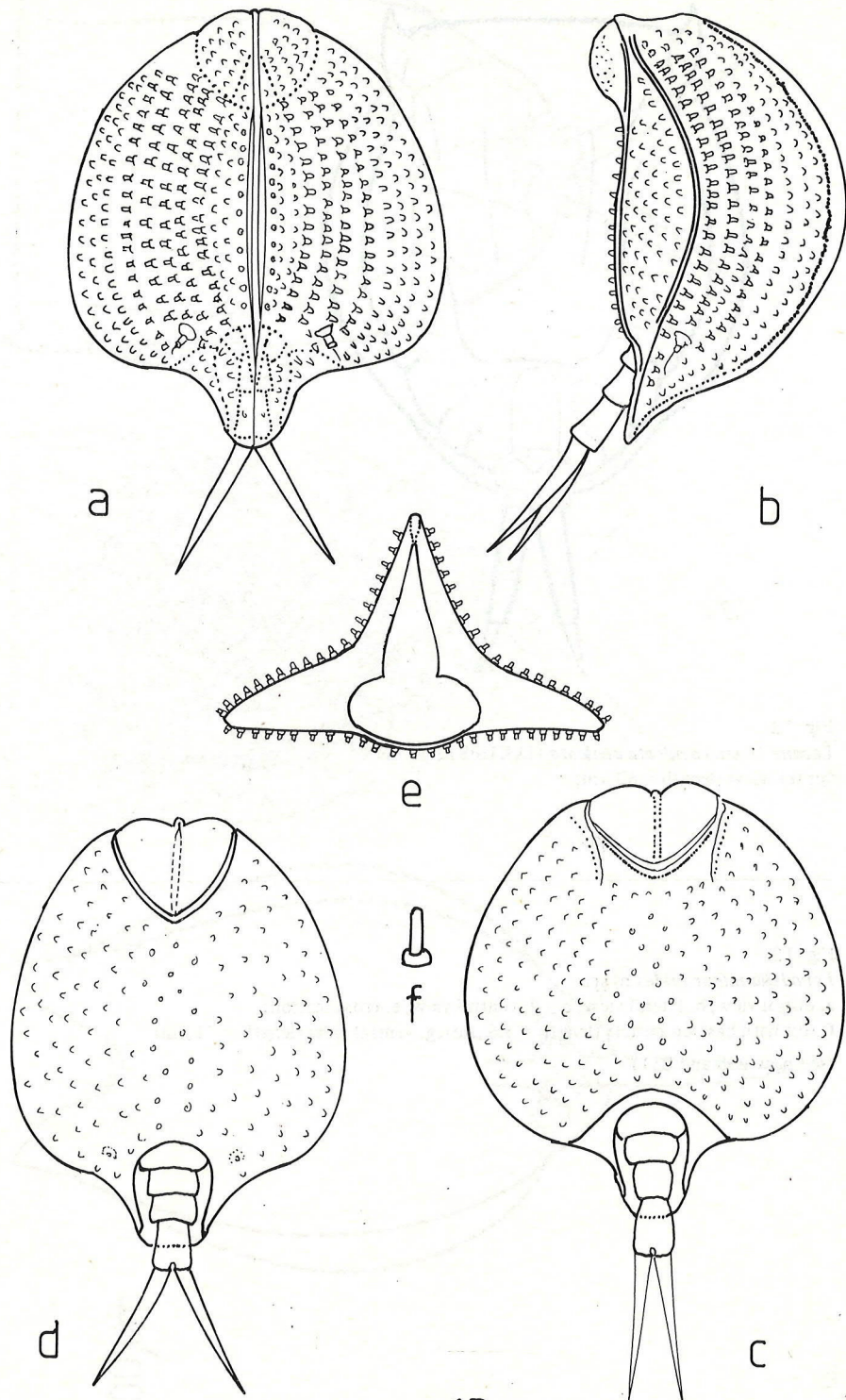


Fig. 12:
Lecane (s. str.) aculeata aculeata (JAKUBSKI 1912)
ventral view (length = 83 μm)

Fig. 13:
Lepadella minoruoides n. sp.
a. dorsal view; b. lateral view; c. - d. ventral view; e. cross section;
f. rod with base on cuticle (length = 3.6 μm); g. ventral view (length = 72 μm).
(see page 250 and 251)



13g

Fig. 14:
Mytilina unguipes (LUCKS 1912)
a. ventral view with lifted toes (length = 114 μm, toe length = 65 μm);
b. cross section (54/40 μm).

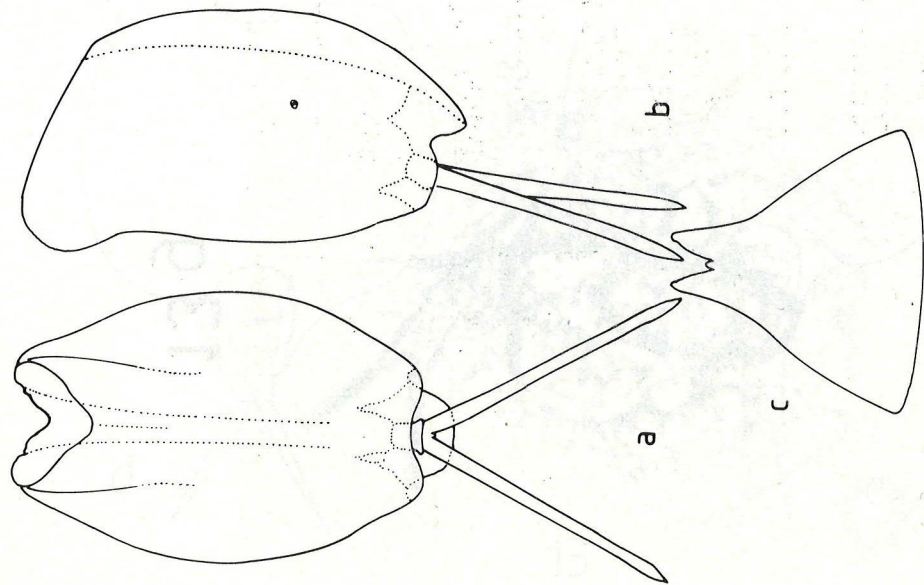


Fig. 15:
Mytilina trigona (GOSSE 1851)
a. ventral view; b. lateral view; c. cross section.

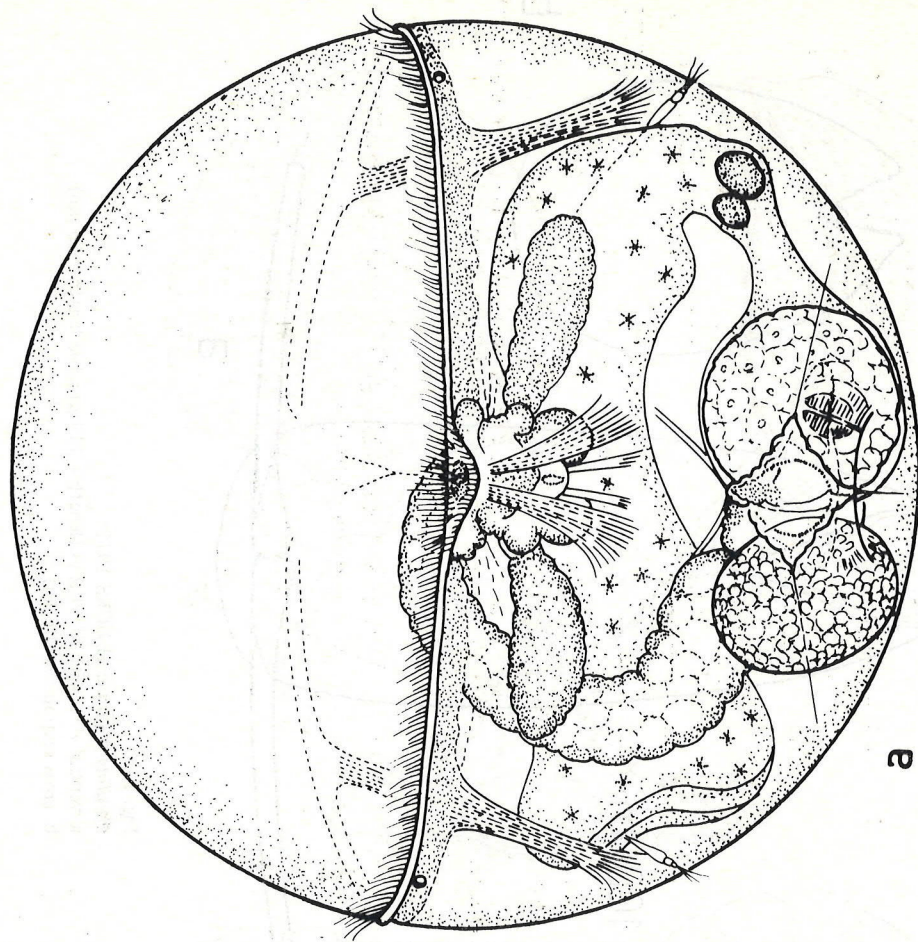
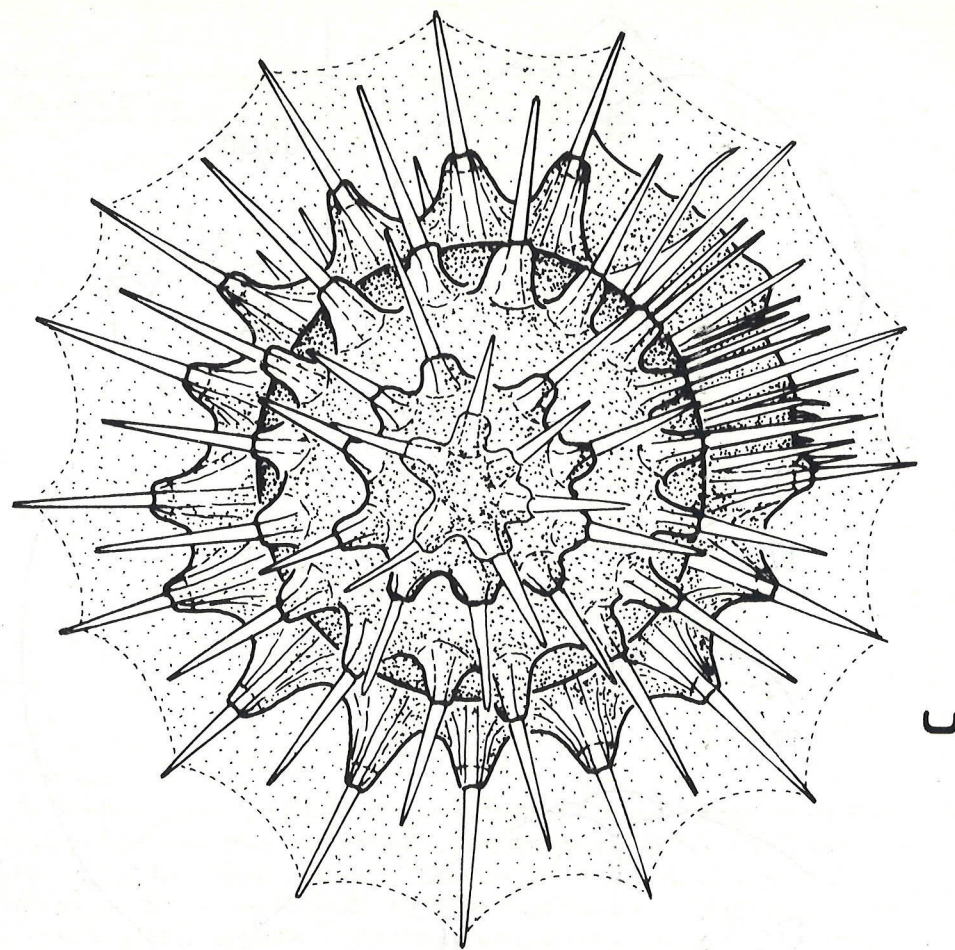
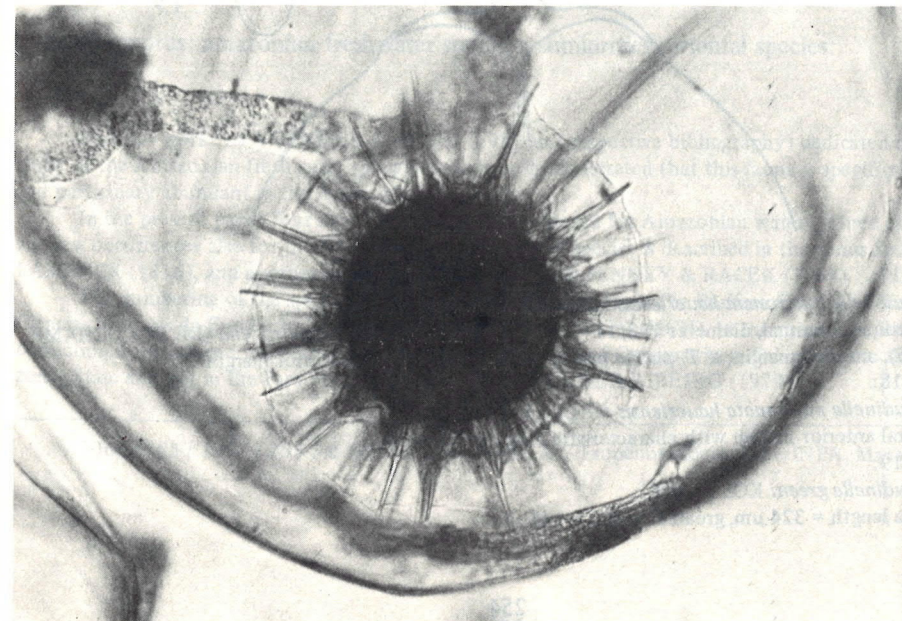


Fig. 16:
Trochosphaera aequatorialis SEMPER 1872
a. ventral view, diameter 800 μ m; b. resting egg; c. resting egg 270/260 μ m.



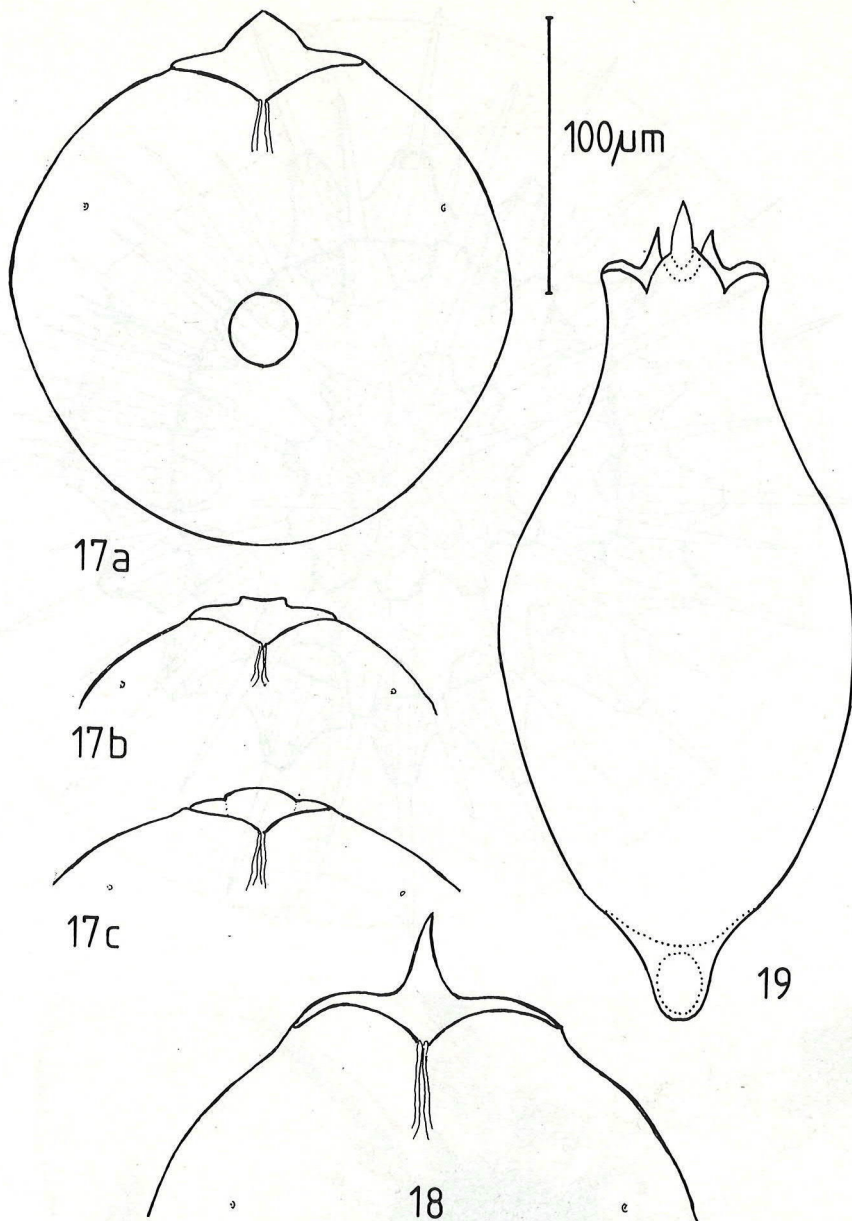


Fig. 17:

Testudinella mucronata haueriensis (GILLARD 1967) n. f.

a. outline of animal, diameter 198/144 μm ; b. *Testudinella patina dendradena* (DE BEAUCHAMP 1955), anterior margin; c. *T. patina patina* (HERMANN 1783), anterior margin.

Fig. 18:

Testudinella mucronata haueriensis (GILLARD 1967)

ventral anterior margin with characteristic long median spine.

Fig. 19:

Testudinella greeni KOSTE 1981

lorica length = 324 μm , greatest width = 148 μm .